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INTERCRYSTALLINE CORROSION OF ALUMINUM ALLOYS.
I. DURALUMINUM

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[A Digest]

Inter-crystalline corrosion in this case is due to the destruction of CuAl_2 deposits along the grain boundaries. For that reason the corrosion of specially prepared CuAl_2 was studied experimentally. It could be shown that aluminum was progressively attracted when this alloy was exposed to 3-percent NaCl . The copper of the alloy remained practically unaffected. Corrosion of the intermetallic compound CuAl_2 was found to exceed that of pure aluminum both in a short-circuited couple and without contact with the latter. It is obvious that, under the circumstances, the action of local micro-couples in the CuAl_2 electrode predominates. The fact that pure aluminum in contact with the intermetallic compound was comparatively unaffected must be regarded as a proof that the inter-crystalline corrosion of duraluminum is due mainly to destruction of the CuAl_2 deposited as a thin layer between the grains.

The phase diagram and conclusions based on X-ray and metallographic investigations permit one to establish that duraluminum consists of three basic structural components: (1) a solid solution of copper in aluminum; (2) practically pure aluminum surrounding inclusions of the θ phase; and (3) the θ phase or CuAl_2 . It is the latter which corrodes, not the aluminum in contact with it.

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